

# THE EFFECTS OF LENGTH OF FEEDING AND LEVEL OF CRUDE FIBER ON CARCASS QUALITY AND SERUM CHOLESTEROL OF BROILER CHICKEN

*by* Jola Londok 12

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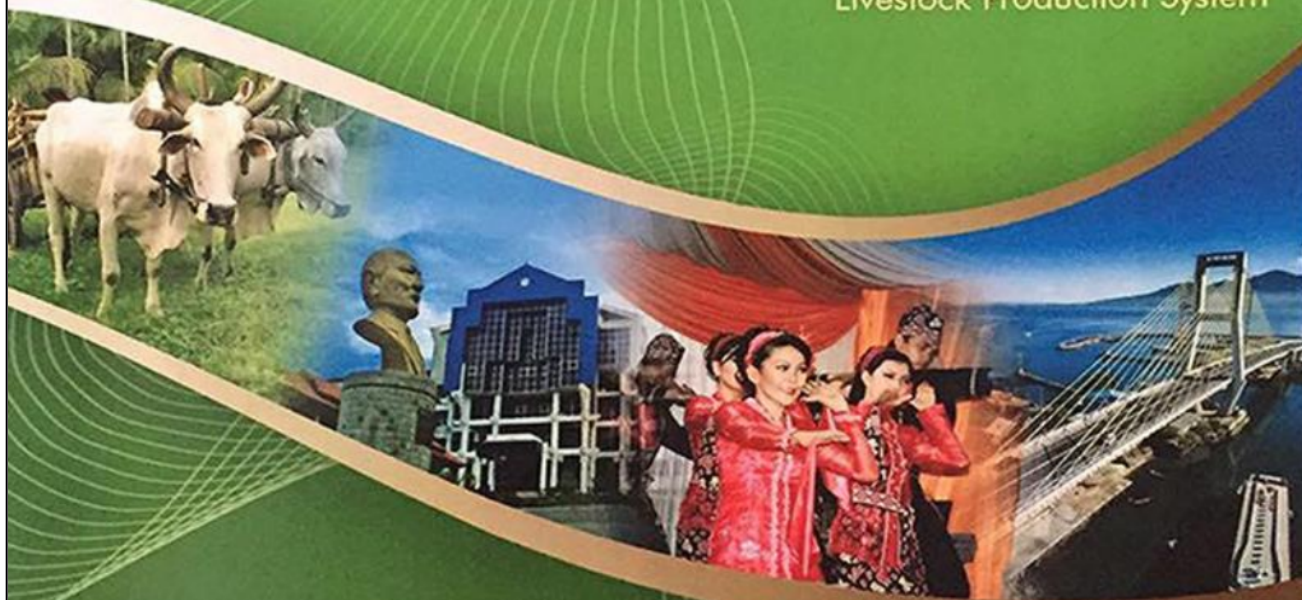
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# PROCEEDING

## 4<sup>th</sup> INTERNATIONAL SEMINAR OF ANIMAL NUTRITION & FEED SCIENCE (ISAINI 2015)

Theme:

Recent Advance in Animal Nutrition  
and Feed Technology of Support Sustainable  
Livestock Production System



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## **WELCOMING SPEECH PRESIDENT OF AINI**

*Assalamu 'alaikum Wr. Wb.,*

**His Excellency Governor of North Sulawesi**

**The honorable Rector of The University of Sam Ratulangi,**

**The Dean of Faculty of Animal Science, University of Sam Ratulangi,**

**Distinguish guests, participants, ladies and gentlemen,**

First of all, on behalf of the Indonesian Animal Nutritionist and Feed Scientist Association (AINI), I would like to extend our warmest welcome, and indeed it is a great pleasure to see you all in this room, participating in the 4<sup>th</sup> International Seminar and 10<sup>th</sup> Biennial Meeting of AINI held in Manado North Sulawesi. At this time being, AINI is almost 20 years old since its first establishment in 1996 at Bogor. AINI was created with the objectives to gather all of the animal nutrition and feed scientists in Indonesia permitting to the exchange of knowledge and experiences under spirit of brotherhood, to stimulate the advancement of science and technology in nutrition and feed science, thus benefiting to the competitiveness of livestock agribusiness.

As the president of AINI since 2007, I and all of board committee member have been trying to do the best we could do for AINI being better well known at the national and International level. This International seminar is conducted with the objective also to serve better the AINI member on new research finding and provide the forum of meeting and exchange among scientists. We have successfully conducts regular international seminar every two years, thanks to the efforts of all AINI member have been dedicated to. The first international conference was held in UNSOED Purwokerto (2009), the second was held in UNPAD Bandung (2011), the third was held in UNAND Padang West Sumatera (2013), and the forth International seminar is held here at UNSRAT Manado North Sulawesi (2015).

**Distinguish guests, participants, ladies and gentlemen,**

The recommendation made by the 3rd International Seminar of AINI (ISAINI), held in Padang, was to recommend the Faculty of Animal Husbandry, Sam Ratulangi University, Manado, to be the host for the 4<sup>th</sup> ISAINI 2015. The Theme of this International Seminar is "**Recent Advance in Animal Nutrition and Feed Technology to Support Sustainable Livestock Production System**". Sustainable livestock production system is now become the hot issue. The huge demand of animal products such as meat egg and milk to cover the growing population in the world should be handled with care without destroying the environment. Environment and its quality are becoming more and more degrading and reducing. Indeed, the effects of global warming could be feeling now with for example the longer dry session period that might reduce even destroy agricultural products and its productivity. In the case of Indonesia, it is projected that the demand of animal products will increased significantly while the national production is not sufficient enough to cover the demand. High price of red meat

and fluctuation of poultry meat price recently indicate the phenomenon of the imbalance supply-demand. We, as the scientist especially in animal nutrition and feed science, should engage and do our best to support the government policy in fulfilling the food of animal products, quantitative and qualitatively. In this regards, role of nutrition and also Nutritionist and Feed Scientist are very important, since the feed cost is the major component cost of livestock production. During this seminar, recent advance in animal nutrition and feed science will be shared and discussed to support the sustainable livestock production system.

**Distinguish guests, participants, ladies and gentlemen,**

On behalf of the AINI, at this opportunity, I should express my sincere thanks to the Dean of the Faculty of Animal Science University of Sam Ratulangi, the organizing committee, sponsors, and all party that cannot be listed since we are deeply in debt to all of your effort and sacrifice to the success of this seminar. Our sincere thanks and deepest gratitude must go to the invited speakers : Prof. Dr. Ir. Muladno, MSA (Director General of Livestock and Animal Health, Ministries of Agriculture of The Republic of Indonesia); Prof. Abdul Razak Bin Alimon, PhD from Putra University, Malaysia; Prof. Cheol-Heui Yun, PhD from Seoul National University, South Korea; Dr. Ir. Osfar Sofjan, MSc from Brawijaya University Malang; Prof. Dr. Ir. David Arnold Kaligis, DEA from Sam Ratulangi University, Manado and Felipe Sanchez Fernandez from Throuw Nutrition. We are in debt to your effort and your participation in this event. Your views will enlighten and inspire all of the participants on how to develop sustainable livestock production system through the animal nutrition and feed science intervention.

**Distinguish guests, participants, ladies and gentlemen,**

I hope you will have the fruitful meeting and gaining many new ideas and perspectives to be developed in the future. I do hope also, we will see you again in the 5<sup>th</sup> International seminar and 11<sup>th</sup> Biannual meeting (ISAINI 2017) in which the host will be determined further by the board of committee meeting during this event. Finally and surely, please enjoy your stay with North Sulawesi culture and nature, tradition and hospitality, in addition to your scientific activities.

**Thank you**

*Wassalamu 'alaikum Wr. Wb.*

Manado, September 8<sup>th</sup>, 2015  
President of AINI

Prof. Dr. Ir. Ali Agus, DAA, DEA



## WELCOMING SPEECH

### ORGINIZING COMMITTEE

**Dear all of the scientists, delegates, participants, ladies and gentlemen,**

As the host of the AINI International Seminar, we do impress, thankful, and present a high appreciation for your participation in joining the AINI International Seminar in Manado, Indonesia, the land of waving coconut trees. We can see the very great enthusiasm of all the scientists to solve livestock problems as well as to share valuable information and knowledge for human prosperity all over the world.

A large numbers of representatives are participating in this conference, which indicates that the interest in the field of animal science is continuously increasing among member countries. We have invited some Plenary Speakers and Invited Papers who are qualified as scientists and bureaucrats in animal nutrition and feed science field to share their valuable information and knowledge. Other participants can deliver their precious research through oral and poster presentations. This Seminar is also paralleled to Indonesian Association of Animal Nutritionist and Feed Scientists (AINI) Congress held by National Board.

The theme of the AINI International Seminar is "*Recent Advance in Animal Nutrition and Feed Technology to Support Sustainable Livestock Production System*". We believe that animal production in Indonesia has become important and strategic sector to provide high quality food, opening up job opportunities, as well as improving farmer's welfare. Indonesian Association of Animal Nutritionist and Feed Scientists, therefore, have to support this growing interest by providing more appropriate, recent, and relevant technologies to supportsustainablelivestockproductionsystem to produce more animal protein food.

On behalf of AINI International Seminar Committee and all associates, we wish all of the participants having a great achievement of success and fulfill the expectation as well as enjoying the interaction with all scientists' participants the Seminar.

High appreciation we may acknowledge to all of sectors, especially for Her excellency Rector of Sam Ratulangi University, who have concerned to facilitate the Seminar and Congress site host. Special thanks to the Steering Committee, Scientific Committee, Reviewers and Editorial Boards for their great contribution to make the Seminar and Congress successfully organized.

To you, you're Excellency, invited guests and delegates, thank you for choosing to cometo this Seminar and Congress and to Manado, Indonesia. We hope the arrangements we have put in place meet with your requirements. We wish you fruitful deliberations and an intellectually and socially rewarding stay in Manado.

We are looking forward to meeting you all in the future congress to continue.

***Terimakasih (Thank you)***

Chairman of the 4<sup>th</sup> AINI International Seminar

Prof. Dr. Ir. BernatTulung, DEA

## KEYNOTE SPEAKERS



**Prof. Dr. Ir. Muladno, MSA**

*Director General of Livestock and Animal Health,  
Ministries of Agriculture of the Republic Indonesia*

Professor Muladno was born in Kediri, East Java on 24 August 1961. He was educated for undergraduate education at Faculty of Animal Husbandry, Gadjah Mada University. His master of science in University of New England, Armidale, Australia in the area animal breeding and genetics. He completed his Ph. D at University of Sydney, Australia in molecular genetics. He pursued his post – doctoral at science and technology agency of Japan at National Institute of Animal Industry, Tsukuba Japan. Then from society for agricultural, forestry and fisheries (STAFF) Institute, Tsukuba, Japan and from Japan Society for Promotion of Science (JSPS) at Nagoya University, Japan and from Indonesian-Australia Programme of specialized training on Intellectual Property Rights at University of Technology, Sydney, Australia.



**Prof. Abdul Razak Bin Alimon, Ph.D**

*Professor, Putra University, Malaysia*

Professor Alimon was born on January 25, 1949. He was educated for his bachelor of science in the area of nutrition and physiology, postgraduate diploma of science and master of science in agriculture at University of New England, Australia. He completed his Ph. D at University of Reading in area of animal nutrition.



**Prof. Cheol-Heui Yun, PhD**

*Professor, Seoul National University, Republic of Korea*

Professor Cheol-Heui YUN grew up in Gwang-ju, a southwest of Republic of Korea. He was educated at the Chon am National University for B.Sc. and the Seoul National University for his M.Sc. in the area of Animal Nutrition. Professor Yun completed his Ph.D at the University of Saskatchewan, Canada in the area of immune modulation and mucosal immunology. Then, he pursued his professional career at leading research institutes in different region of the world including International Vaccine Institute (IVI, Korea), United States Department of Agriculture (USDA, USA), National Institutes of Health (NIH, USA) and Gothenburg University (Sweden) where he undertook research related to vaccinology, infection biology and cellular immunity. Currently, he serves as editor of a number of societies including World Journal of Immunology, Frontiers in Molecular Innate Immunity, Journal of Biomaterials and Tissue Engineering, Scientific World Journal, Journal of Microbiology, and Science Editing. He was selected and serves as a vice Editor-in-Chief at Asian-Australasian Journal of Animal Sciences. Currently, he is the president of Korean Dendritic Cell Academic Society. Recently, his interest has focused on the action mechanism of vaccine and vaccine adjuvants against a various (mucosal) diseases in mouse as a model system and ultimately domestic animals.



**Dr. Ir. Osfar Sjojfan, MSc**

*Faculty of Animal Husbandry, Brawijaya University, Malang, Indonesia*

Dr. Osfar was educated for B.Sc in Animal Husbandry at Padjajaran University and M.Sc in Poultry Feed at Wageningen Agricultural University, The Netherlands. He pursued his doctoral in Animal Science at University of Padjajaran, Bandung. His interest in Animal Nutrition.



**Prof. Dr. Ir. David Arnold Kaligis, DEA**

*Professor, Faculty of Animal Husbandry, Sam Ratulangi University, Manado, Indonesia*

Professor Kaligis was born in Semarang on December 9, 1948. He was educated at Faculty of Animal Husbandry, Sam Ratulangi University (Undergraduate), Universite Science et Technique du Languedoc Montpellier, France for his master and doctor in agronomi option zootechnique. His interest in forages sciences.



**Felipe Sanchez Fernandez**

*Trouw Nutrition Application and Solution Center  
Poultry Specialist and Technology Transfer*

Veterinarian bachelor marketing and sales management master degree. More than 20 years working in poultry production as Poultry Product Manager, in Cargill Animal Nutrition and Nutreco compound feed business, with direct responsibilities on poultry nutrition, technical consultancy services and business development manager. In 2012, he was appointed to Trouw Nutrition Application and Solution Centre when he lead R and D projects and transfer innovations and technology to Nutreco operative companies.

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## THE EFFECTS OF LENGTH OF FEEDING AND LEVEL OF CRUDE FIBER ON CARCASS QUALITY AND SERUM CHOLESTEROL OF BROILER CHICKEN

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### ABSTRACT

The objective of this study was to obtain the effect of length of feeding (L) and level of crude fiber (LCF) on carcass quality of broiler. This research was used Completely Randomized Design (CRD), Factorial pattern 4 x 3. Factor A were 4 LF of feeds, namely: A<sub>1</sub> (4 days); A<sub>2</sub> (6 days); A<sub>3</sub> (8 days); and A<sub>4</sub> (16 days). Factor B were 3 LCF of feeds, namely: B<sub>1</sub> (5%); B<sub>2</sub> (7.5%); and B<sub>3</sub> (10%). Each treatment was repeated 2 times. Three weeks of age of 120 broiler chickens were used in this research. Variables which measured were carcass quality as weight of carcass, abdominal fat weight, and serum cholesterol. The experiment data were analyzed using ANOVA, and HSD test was then performed to showed the difference between treatments. The analysis of variance showed that the treatment has not gave an interaction between factor A and B ( $P > 0.01$ ) on carcass weight, and abdominal fat weight ( $P < 0.05$ ). The treatment no affected for serum cholesterol. The treatment as length of feeding (Factor A) has effects significantly ( $P < 0.05$ ) on carcass weight, and abdominal fat weight ( $P < 0.05$ ). Combination of length of feeding and level of crude fiber caused not affected in carcass weight, abdominal fat, and serum cholesterol. However length of feeding tend to decreasing carcass weight and abdominal fat content.

Keywords: *Feed restriction, Carcass quality.*

### INTRODUCTION

Development of livestock production, especially meat consumption pattern seen from the people of Indonesia experienced the dilemma, on one hand meat consumption per capita is still low, on the other hand there is a certain tendency of consumers to limit consumption of poultry meat due to fat content which is considered a negative effect on food quality (cholesterolphobia). Recommendations on food to live healthy is starting lively populous in various developed countries in the world and even the world organization board such as WHO, has conveyed a message for people to consume less fat and cholesterol, and consume a lot of starch and fiber. The issue is certainly a very big challenge for the development of livestock production in the century now and the future. Similarly, due to bird flu outbreaks also affect the consumption of chicken meat, especially because there are allegations of the population of bacteria, especially pathogenic microorganisms such as salmonella in the digestive organs can be contaminated in chicken meat during the cutting process. This issue is certainly a challenge for expert animal husbandry in order to develop a leaner supply products in order to produce cattle with low fat content carcass but have high edible portion of meat as a source of safety food for consumers. Compensatory growth is genetic potential of livestock as part of manivestasi hyperplasia and hypertrophy cell at a particular phase or period of

growth with environmental factors. Feed restriction or limitation of feed intake can be applied in the livestock business in a period / phase specific pertubuhan for two purposes of improving feed efficiency and meat quality. Feed consumption restriction has dimension of feed intake reduction (reduction of total consumption) and reduction either quantity or quality of feed. Time and duration of feed restriction both in quantity and quality will affect the response of livestock through compensation of its growth. If the concept application is made in accordance with the of animal growing period which fed both quantity and quality that fit with the needs of animal, the compensation growth will give a positive response to both feed efficiency and carcass quality as well as to the characteristics of digestive organs.

Meat chickens are a very strategic commodity livestock for food security including animal protein needs of the Indonesian people because it has several advantages over other meat commodities. Chicken meat has a high taste so preferably ranging from children to adults, high biological value, price is relatively cheap, so affordable by almost all social strata. On business side, broiler farm is relatively easy to better control the business scale and investment management. Another benefit of chicken meat commodity that is such of meal can be found very wide ranging from households, restaurants through the high prestige hotels where the chicken meat dish is offered in various menus, and it can be found wherever at home or abroad. Most of all, the duration time of growing chicken meat is very short, in which within 4 weeks (28 days) it has reached an ideal weight so it is very effective selling produce meat.

## METHODS

The research experiment was conducted in Faculty of Animal Husbandry Sam Ratulangi University, starting from June to August, 2015.

### Research Materials

Animal Experiments: This study was used 3 weeks of age of 120 broiler chickens strain CP 707 from PT. Charoen Pokphand Indonesia.

Experiment Feed: The experiment feeds which used for the study were of commercial feed CP 11 and CP 12 where the content of nutrients are given in Table 1.

**Tabel 1. Nutrients Composition in Commercial Feed**

Nutrients	CP 11	CP 12
Water (%)	13,00	13,00
Protein (%)	21,00 - 23,00	19,00 - 21,00
Energy (kcal)	2.961	3.180
Fiber (%)	5,00	5,00
Ash (%)	7,00	7,00
Calcium (%)	0,90	0,90
Phosphorus (%)	0,60	0,60

Source: PT. Chareon Pokphand Indonesia

24 units of the battery cage system were used in this study. Each cage unit was occupied 5 heads of chickens and equipped with dining and drinking plastic cups. Other equipment used were knives, plastic bags, buckets, cutter, rulers, scales and gauges.

### Research Methods

This research was used <sup>19</sup>completely Randomized Design (CRD), Factorial pattern 4 x 3. Factor A were 4 levels, namely: A<sub>1</sub>(4 days); A<sub>2</sub> (6 days); A<sub>3</sub>(8 days); and A<sub>4</sub> (16 days). Factor B were 3 levels of feeds, namely: B<sub>1</sub> (5%); B<sub>2</sub> (7.5%); and B<sub>3</sub>(10%). Each treatment was repeated 2 times. Experimental unit in this study amounted to 24. Each treatment consisted of 5 chickens. This study used 120 broiler chickens that were selected from 200 chickens to fit gain weight uniformity. The feed that used was a commercial feed.

### Research Procedure

Rearing chickens were conducted during 42 days which included 21 day starter period and 21 day finisher period. During the starter period chickens were kept in a litter cage. At 21 days of age the weight of chicken were measured to take the initial body weight of the study. Chicken with equal weight were placed randomly into 6 treatments and identity was then labeled in each cage. On day of 21 the amount of chickens feed intake was measured as a benchmark for the treatment of feed restriction. Within 24, 28, 32, and 36 days feed restriction treatments were carried out, then later on the day of 37 to 41 the chicken fed *ad libitum*. Feed intake was observed everyday by measured given amount of each feed <sup>25</sup>treatments subtracted by its residual. On the day of 41 the experiment chickens were fasted for 12 hours, where then weighed to determine the final body weight of the study. At the end of the study the day of 42 the chickens were slaughtered to be taken the carcass. Research variables were carcass weight, abdominal fat and serum cholesterol

### Data Analysis Method

This research data analyzed by analysis of variance (Kusriningrum, 2008). The difference among treatment were determined by Least Significant Difference (LSD) test (LSD Fisher).

## RESULT AND DISCUSSION

### Effect of treatment on carcass weight

The averages of carcass weight for each treatment were shown in Table 3. It can be seen the average carcass weight in this experiment was 1654.32-1804.03 gram. head<sup>-1</sup>, in which nearly the whole treatments were decreased in carcass weight. Results of the analysis of variance showed that the combination of length of feeding and crude fiber content in the diet was not significantly different interactions. The analysis of variance showed that the length of feeding were significantly (P<0.05) effected on carcass weight. The LSD test showed <sup>12</sup>that the 4-day long giving significantly different from the 8, 12 and 16 days. Carcass weight is influenced by live weight, so the weight of live <sup>12</sup>will followed by a large carcass weight as well. Wahju (1992) stated that the high carcass weight is supported by the end of the live weight. Furthermore, Resnawati (2004) explains that the resulting carcass weight is influenced by several factors such as age, sex, weight pieces, big and body conformation, fat content, quality and quantity of rations and strains maintained.

**Table 3 The averages of carcass weight, abdominal fat, and serum cholesterol.**

Treatment	Carcass weight (g.head <sup>-1</sup> )	Abdominal Fat (g.head <sup>-1</sup> )	Serum Cholesterol (mg/dl)
A <sub>1</sub> B <sub>1</sub>	1682.63	24.15	130.63
A <sub>1</sub> B <sub>2</sub>	1710.64	25.39	126.38
A <sub>1</sub> B <sub>3</sub>	1765.64	29.68	126.88
A <sub>2</sub> B <sub>1</sub>	1732.00	23.96	143.50
A <sub>2</sub> B <sub>2</sub>	1804.03	21.27	134.50
A <sub>2</sub> B <sub>3</sub>	1765.64	30.91	119.00
A <sub>3</sub> B <sub>1</sub>	1678.65	31.48	121.50
A <sub>3</sub> B <sub>2</sub>	1654.32	22.17	131.00
A <sub>3</sub> B <sub>3</sub>	1740.00	29.45	125.00
A <sub>4</sub> B <sub>1</sub>	1660.00	23.99	118.00
A <sub>4</sub> B <sub>2</sub>	1710.00	22.14	129.00
A <sub>4</sub> B <sub>3</sub>	1770.07	23.97	142.00

Notes: The different superscript on the same row was significantly differences ( $P < 0.05$ )

#### Effect of treatment on abdominal fat

The research data in Table 3 shows the average weight of abdominal fat chicken experiment were 21.27 - 31.48 g.head<sup>-1</sup>. Results of the analysis showed that the combination treatment of length of feeding and crude fiber content in the diet was not significantly different in their interactions affect abdominal fat weight of the broiler. For a long treatment rationing indicate a difference, treatment of crude fiber content in the diet affects weight of abdominal fat is not significant ( $P > .05$ ). For a long treatment rationing, using LSD test showed that the 4-day long giving significantly different from the 8, 12 and 16 days.

According to Fontana *et al.* (1993), abdominal fat will rise to the chickens fed diets with low protein and high-energy rations. The excess energy will be stored as fat in the tissues. One part of the body that is used to store fat by chickens is part around the abdomen. Fat content in broiler chicken carcass is required to give a good appearance on the cuts and to improve the quality of the meat, however if too much it will damage the quality of meat (Amrullah, 2004). The amount of energy consumed in excess will be stored in fat cells. One of place where the fat is accumulation is in the abdominal area. Abdominal fat accumulation is considered as a waste of food energy that resulted in carcass shrinkage.

#### Effect of treatment on serum cholesterol

The averages of serum cholesterol levels can be seen in Table 3. The data results showed the highest serum cholesterol levels in the treatment of A<sub>2</sub>B<sub>1</sub> was 143.50 mg/dl and the lowest in the treatment of A<sub>4</sub>B<sub>1</sub> was 118.00 mg/dl. Results of the analysis showed that the combination treatment of length of feeding and crude fiber content in the diet have not significantly different affect the serum cholesterol.

### CONCLUSION

Combination of length of feeding and level of crude fiber caused not affected in carcass weight, abdominal fat, and serum cholesterol. However length of feeding tend to decreasing carcass weight and abdominal fat content.



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